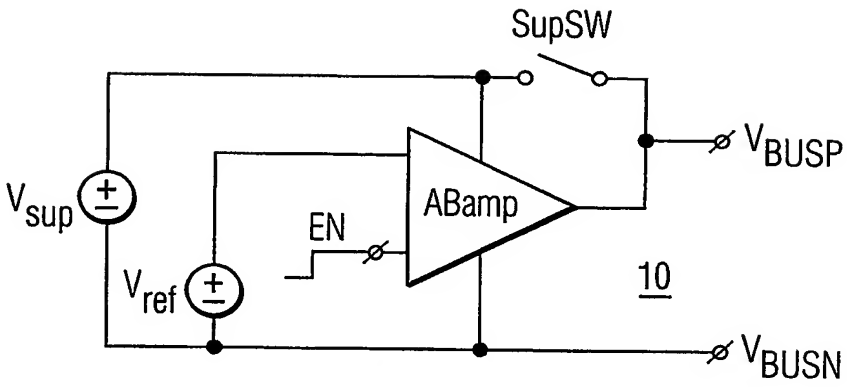

FIG. 1a
PRIOR ART

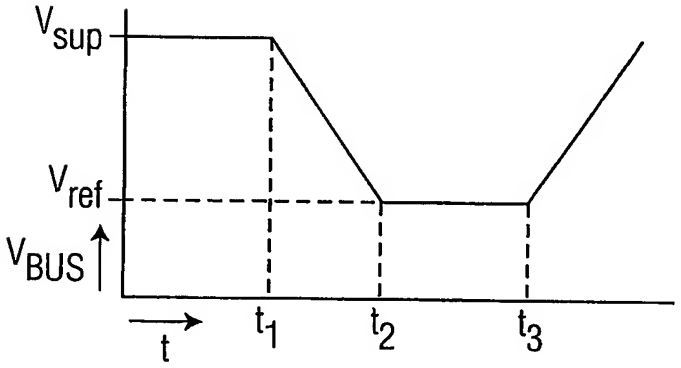

FIG. 1b
PRIOR ART

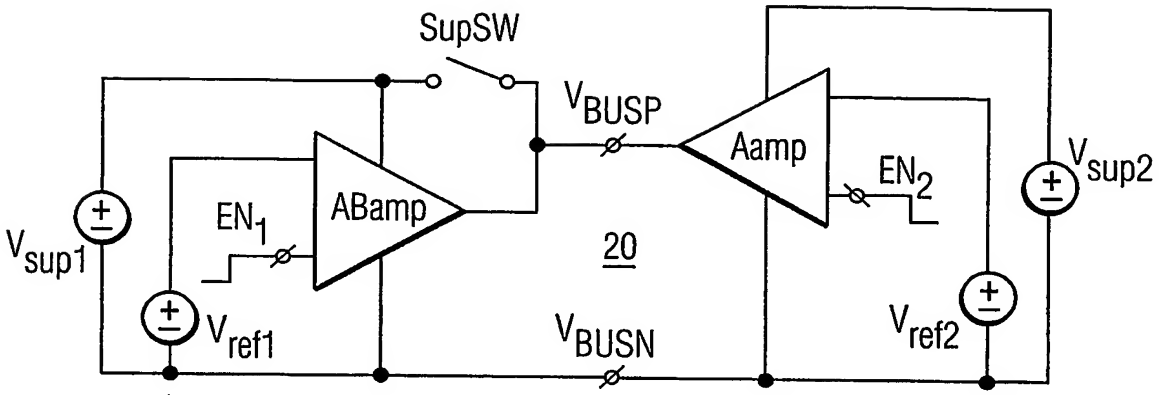

FIG. 2a
PRIOR ART

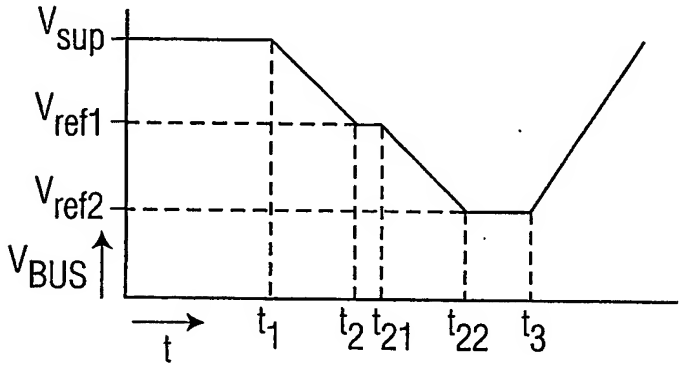

FIG. 2b

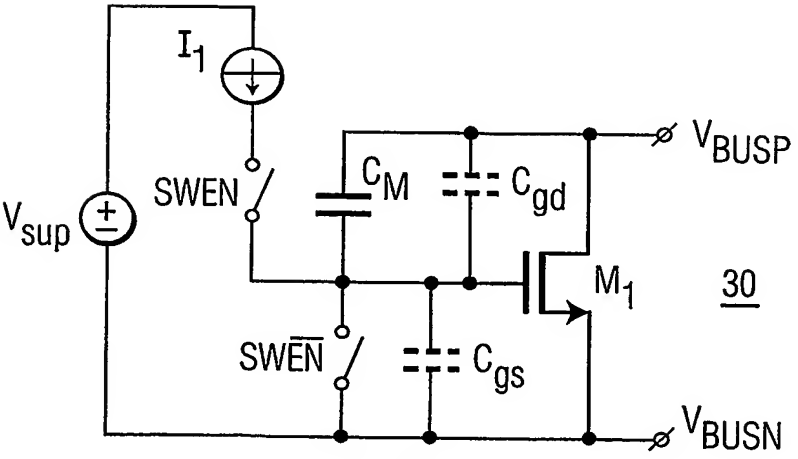

FIG. 3
PRIOR ART

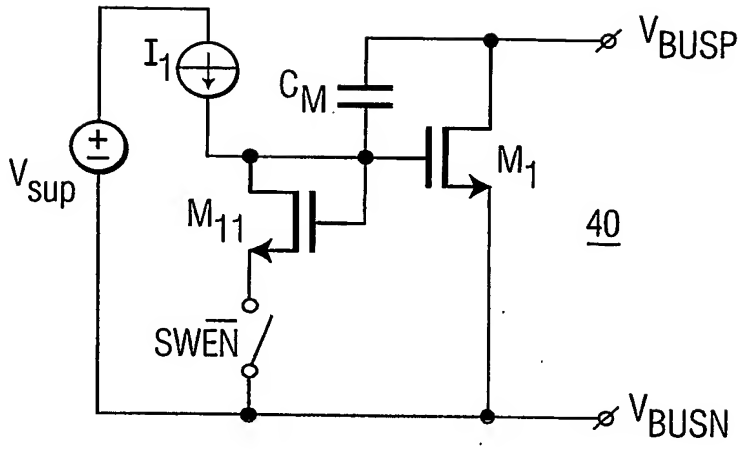
I1
CM
VBUSP
Vsup
M1
M11
40
SWEN
VBUSN

FIG. 4

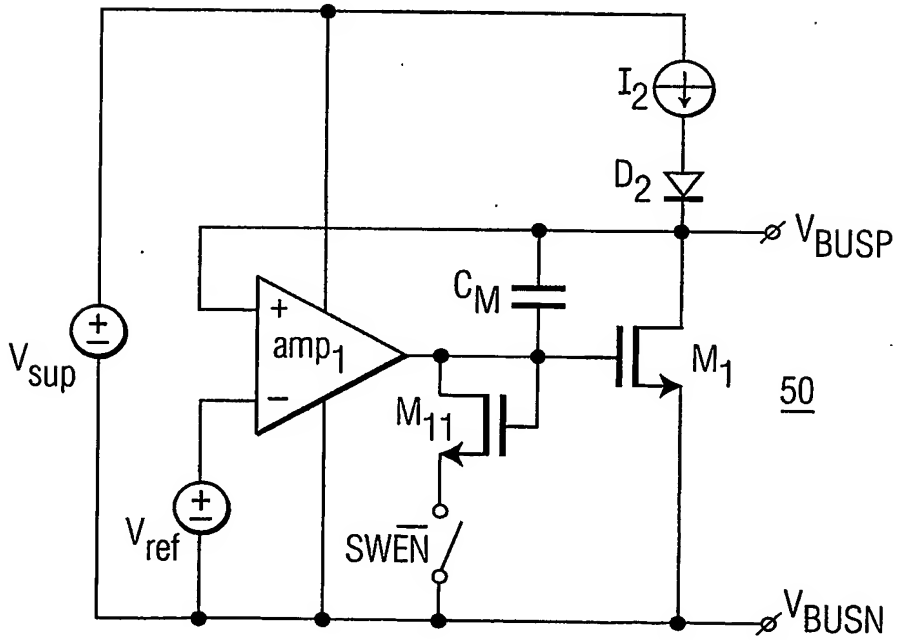
I2
D2
VBUSP
CM
amp1
Vsup
M1
50
M11
Vref
SWEN
VBUSN

FIG. 5

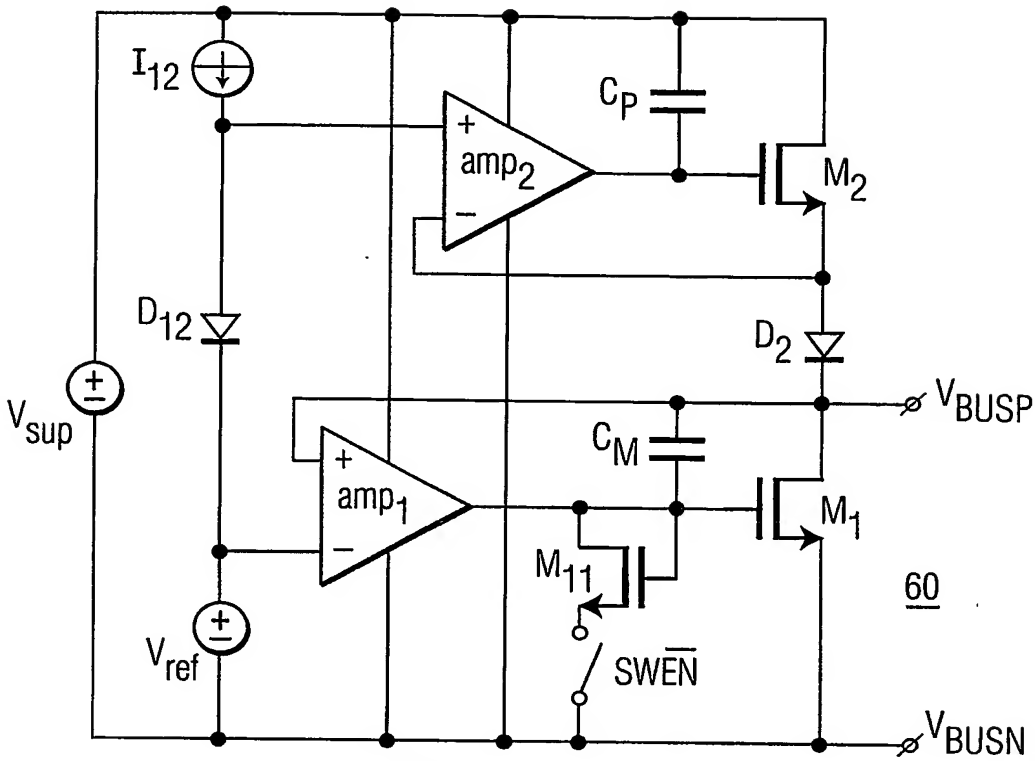
I12
CP
amp2
M2
D12
D2
Vsup
VBUSP
CM
amp1
M1
M11
60
Vref
SWEN
VBUSN

FIG. 6

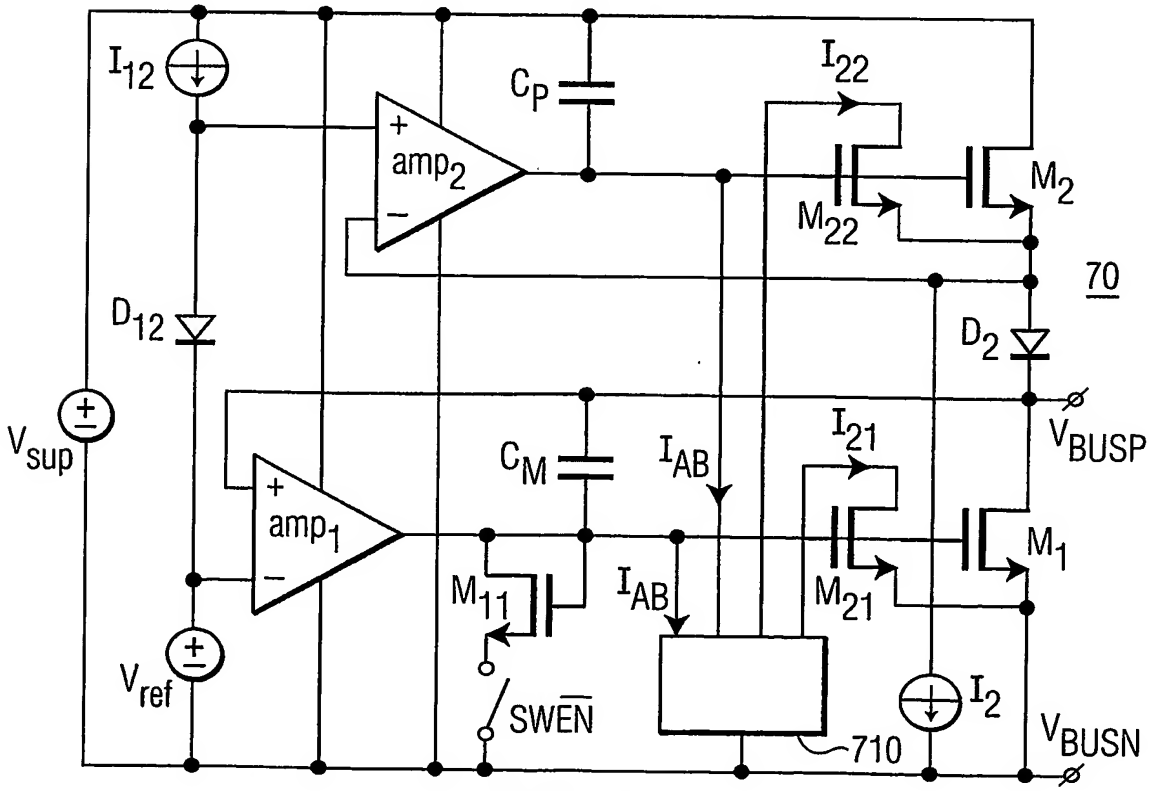
I12
CP
I22
amp2
M2
M22
70
D12
D2
Vsup
VBUSP
CM
IAB
I21
amp1
M1
M11
IAB
M21
Vref
SWEN
I2
VBUSN
710

FIG. 7

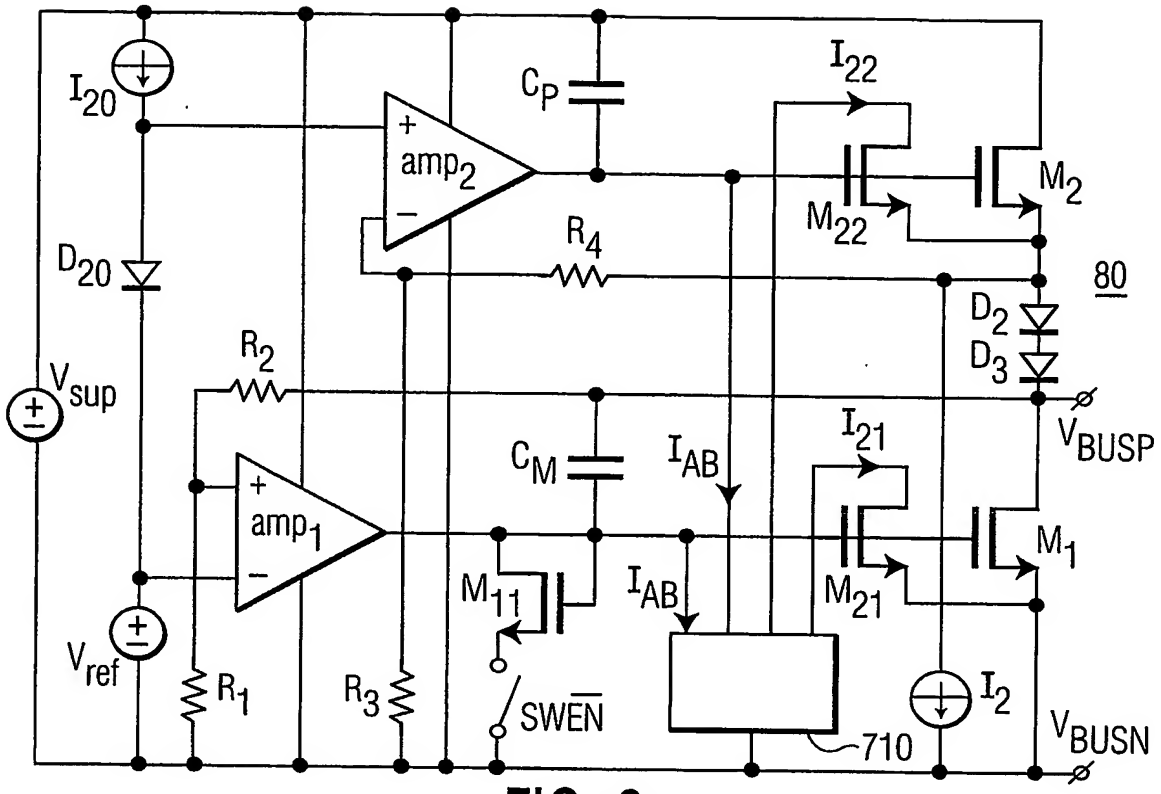
I20
D20
Vsup
Vref
R1
R2
R3
R4
amp2
amp1
CP
CM
IAB
I22
M22
M2
I21
M21
M1
M11
SWEN
710
I2
80
D2
D3
VBUSP
VBUSN

FIG. 8

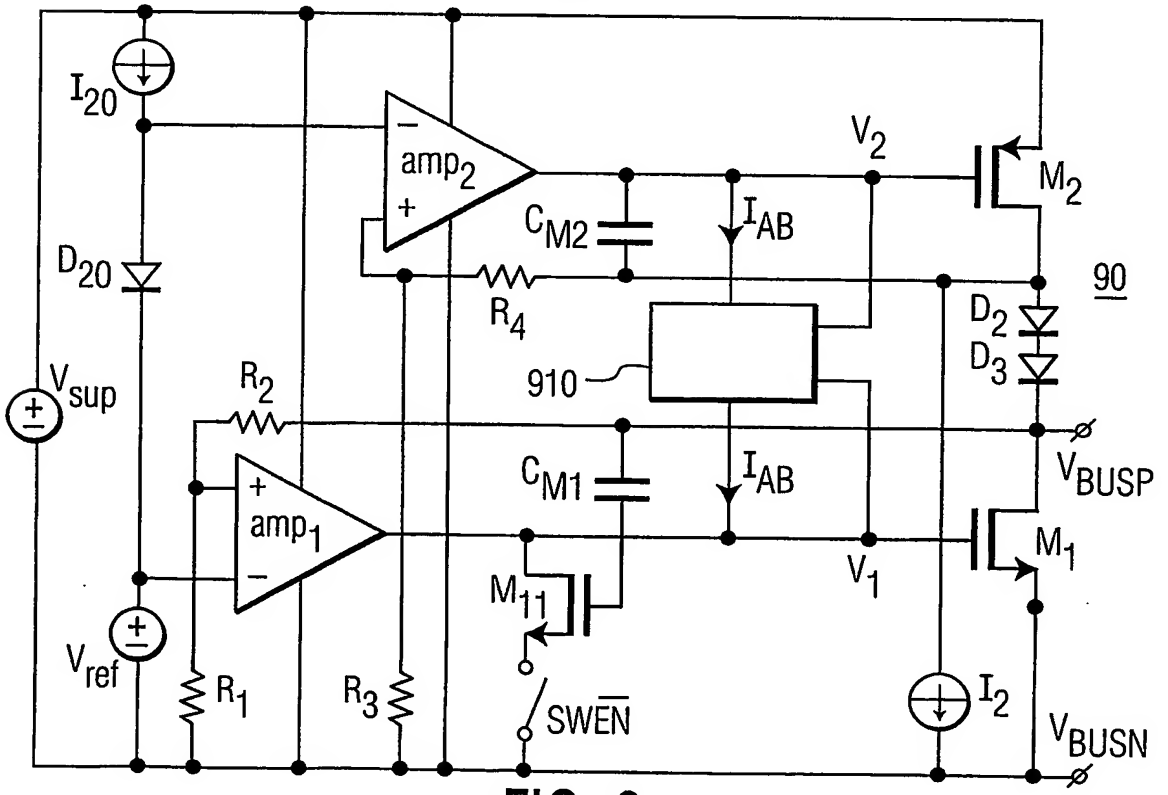
I20
D20
Vsup
Vref
R1
R2
R3
R4
amp2
amp1
CM2
CM1
IAB
V2
V1
M2
M1
M11
SWEN
910
I2
90
D2
D3
VBUSP
VBUSN

FIG. 9

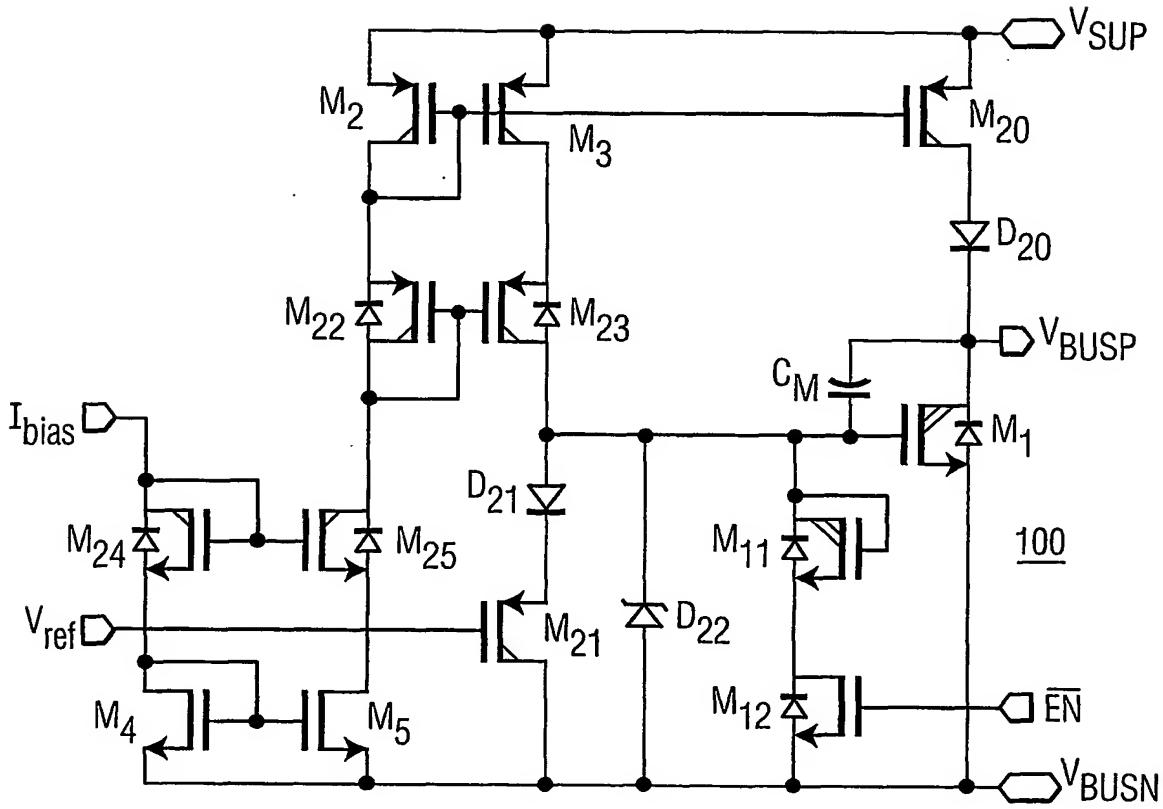
V_{SUP}
M_2
M_3
M_{20}
D_{20}
M_{22}
M_{23}
V_{BUSP}
C_M
I_{bias}
M_1
D_{21}
M_{24}
M_{25}
M_{11}
100
V_{ref}
M_{21}
D_{22}
M_4
M_5
M_{12}
$\overline{EN}$
V_{BUSN}

FIG. 10

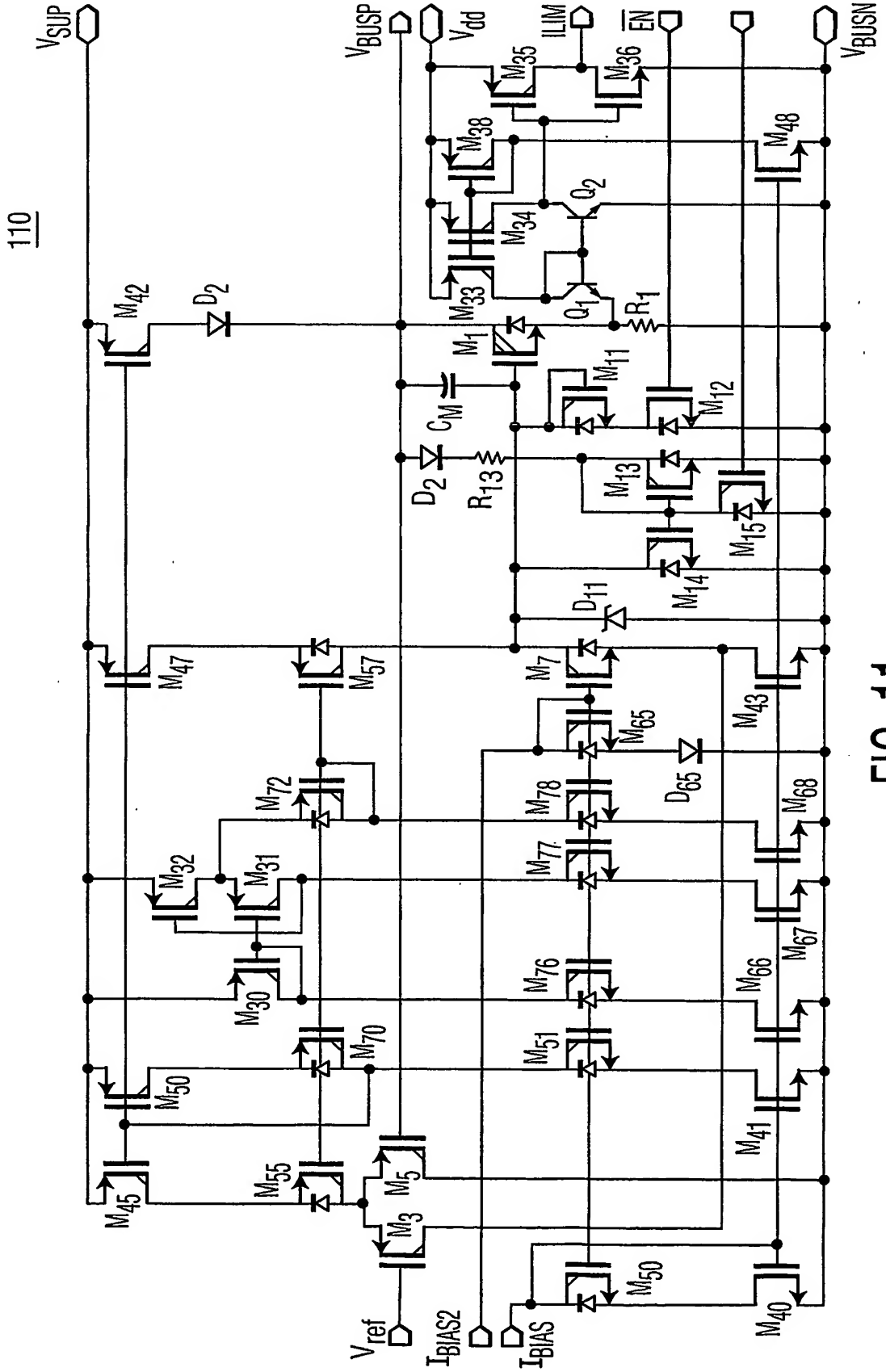
110
VSUP
VBUSP
Vdd
ILIM
EN
VBUSN
M35
M36
M38
M48
Q2
M34
M33
Q1
R1
M42
D2
M1
M11
M12
CM
D2
R13
M13
M15
M14
D11
M47
M57
M7
M43
M65
D65
M72
M78
M68
M32
M31
M77
M67
M30
M76
M66
M70
M51
M50
M41
M55
M5
M45
M3
Vref
IBIAS2
IBIAS
M50
M40

FIG. 11

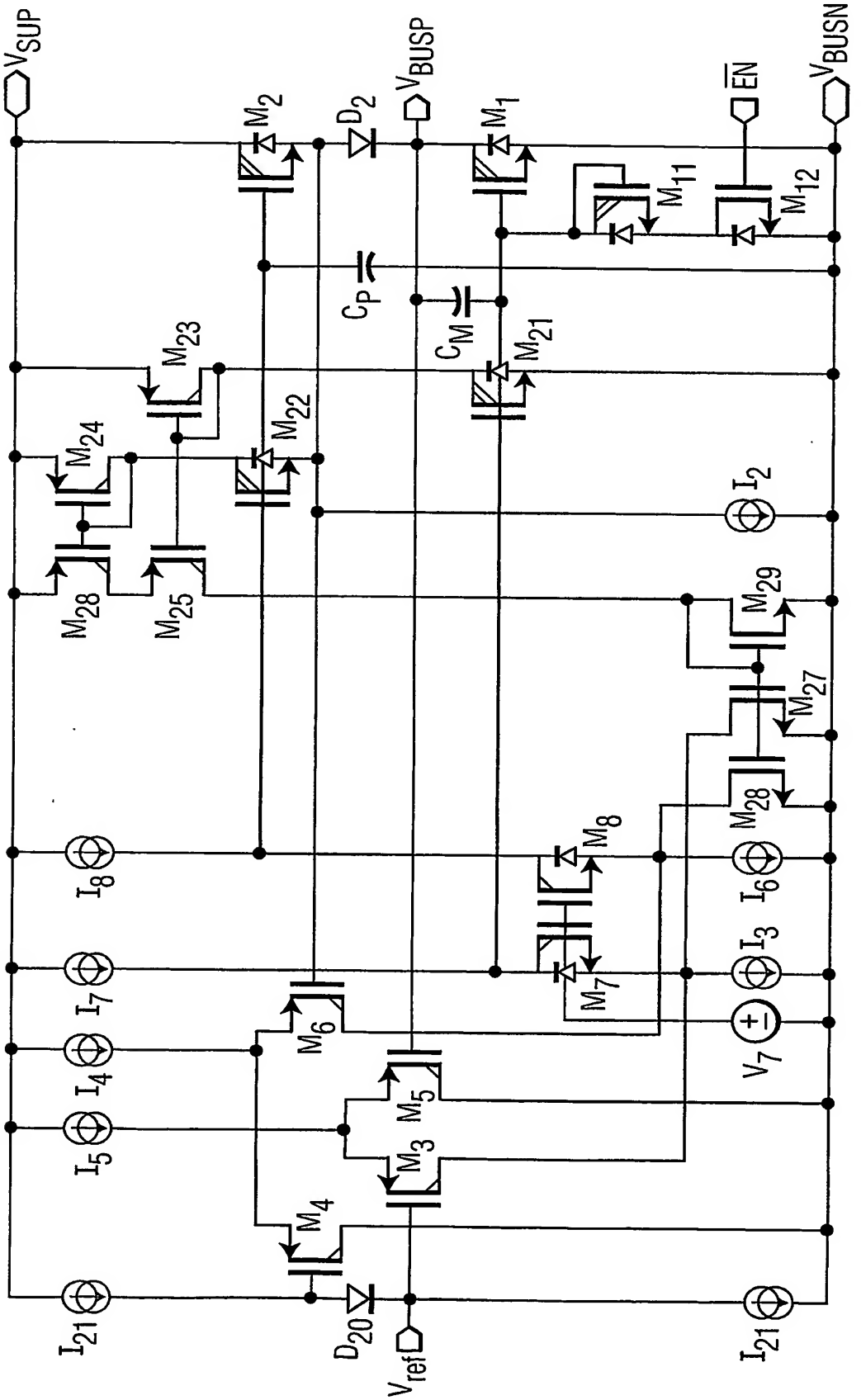
VSUP
VBUSP
VBUSN
EN
M2
D2
M1
M11
M12
CP
CM
M21
M23
M22
M24
M28
M25
I2
M29
M27
M28
M8
I8
I6
I7
I3
M7
M6
V7
I4
M5
I5
M3
M4
I21
D20
Vref
I21
120

FIG. 12

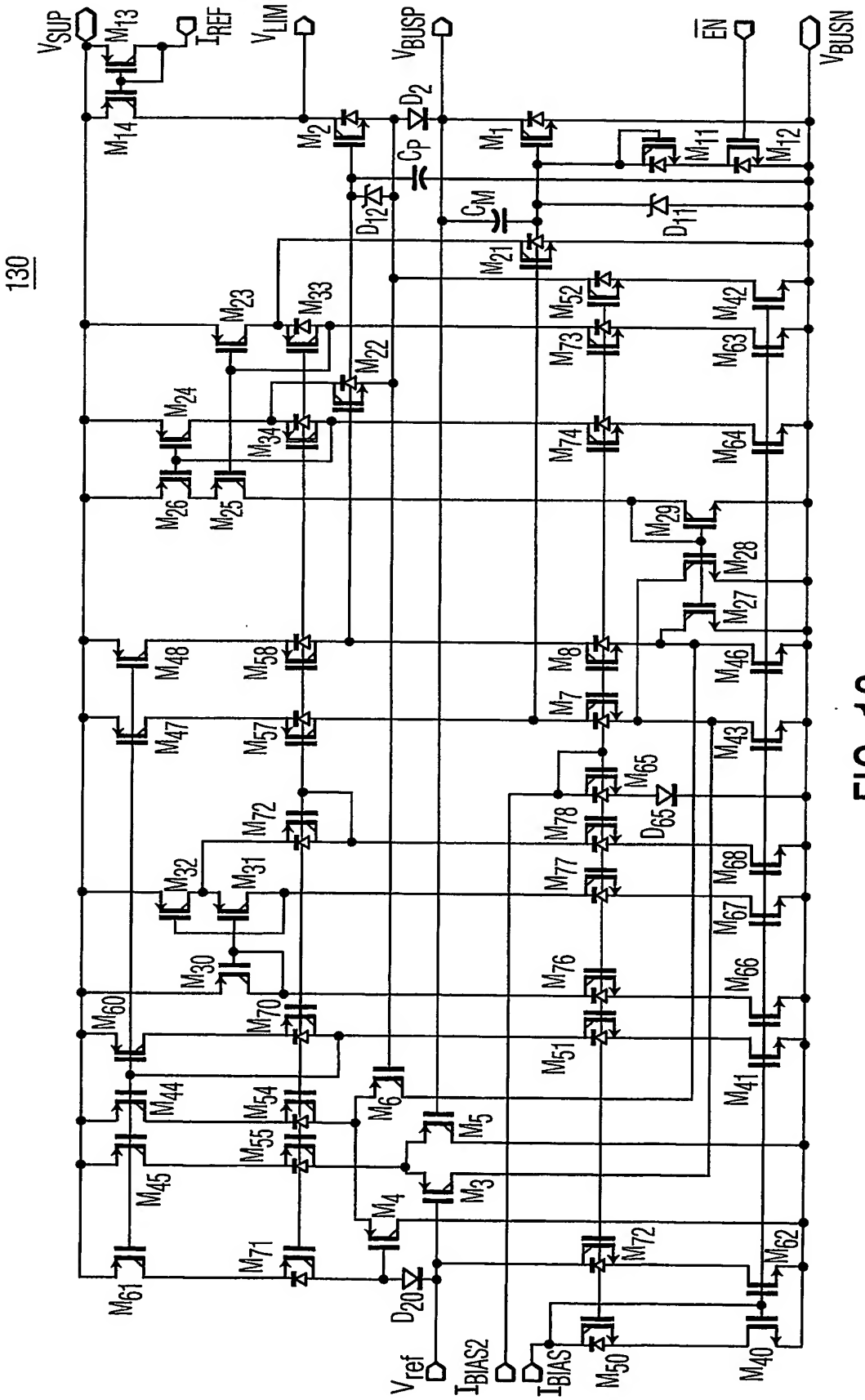

FIG. 13

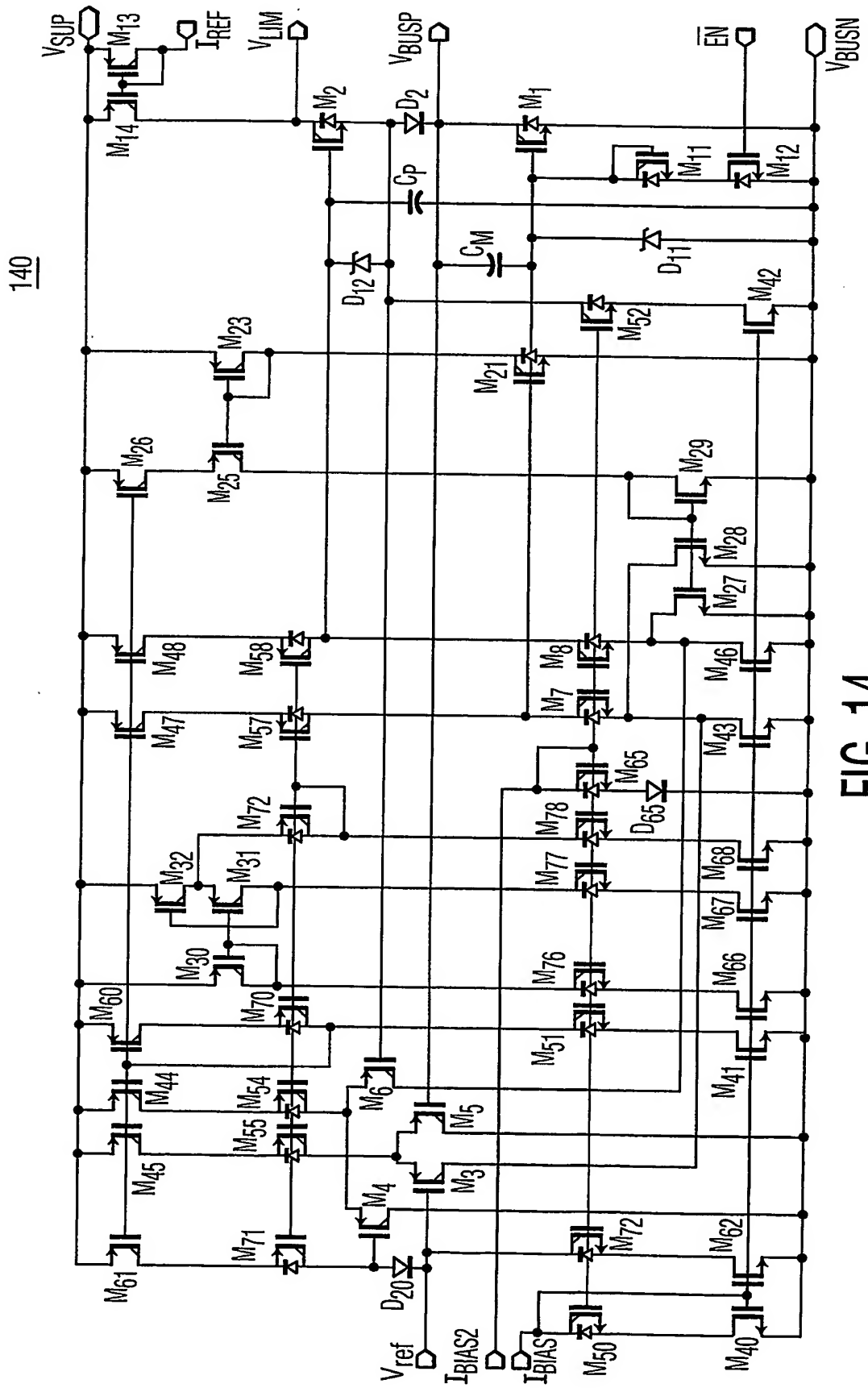
140
VSUP
M13
IREF
VLIM
VBUSP
EN
VBUSN
M14
M2
D2
M1
M11
M12
CP
CM
D11
D12
M52
M42
M23
M21
M26
M25
M29
M28
M27
M48
M58
M8
M46
M7
M47
M57
M43
M65
D65
M72
M78
M32
M31
M77
M68
M67
M30
M76
M66
M60
M70
M51
M41
M44
M54
M6
M5
M55
M45
M4
M3
M71
M72
M62
M61
D20
Vref
IBIAS2
IBIAS
M50
M40

FIG. 14

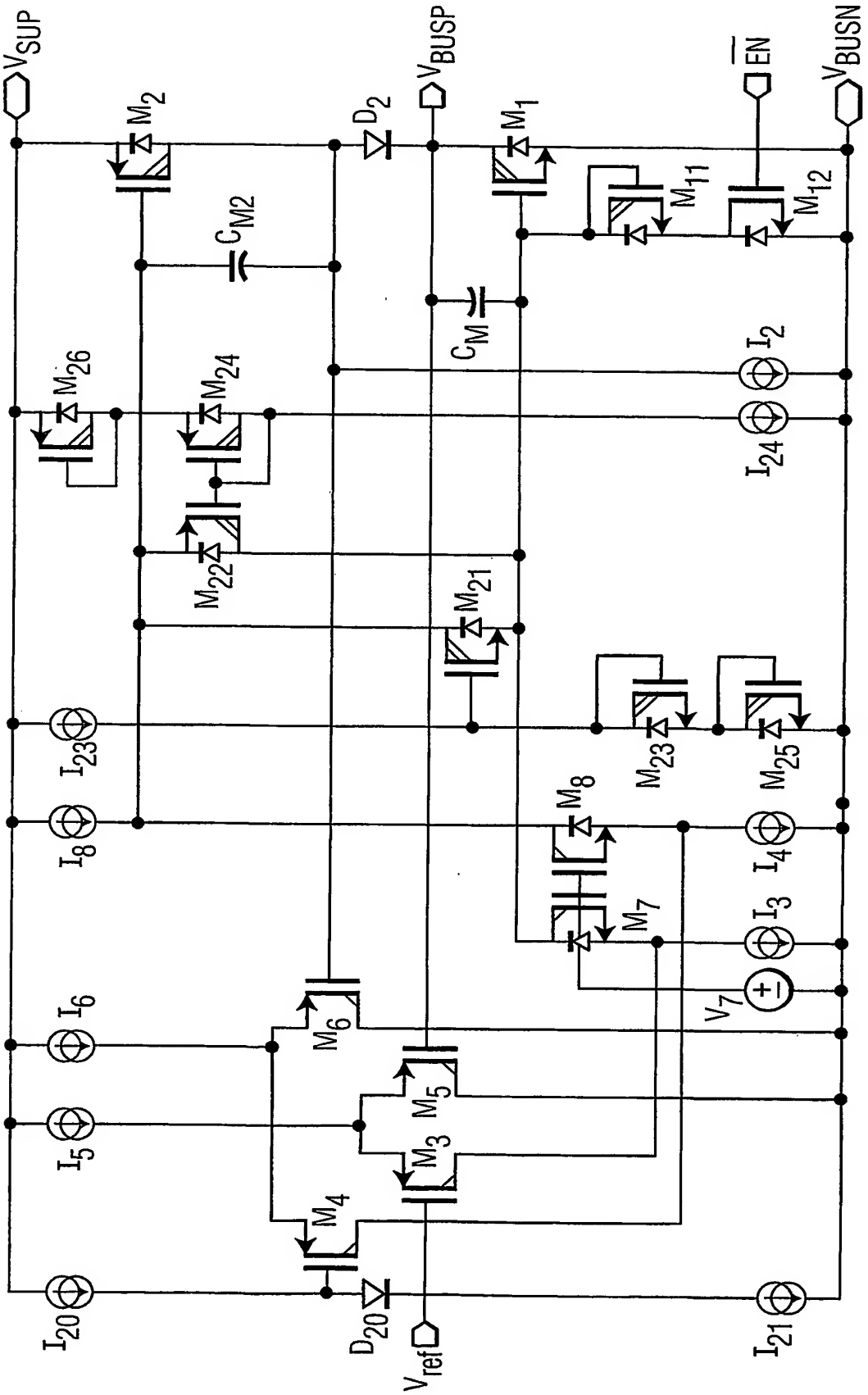
VSUP
VBUSP
EN
VBUSN
M2
D2
M1
M11
M12
CM2
CM
M26
M24
M22
M21
I2
I24
I23
I8
M23
M25
M8
M7
I4
I3
V7
I6
M6
M5
M3
M4
I5
I20
D20
Vref
I21
150

FIG. 15